

① Compare the two following problems and complete them as far as you are able.

(a) Find the area of the rectangle if $x=24$. $\begin{matrix} x \\ \boxed{A=24y/2} \\ y \end{matrix}$

(b) Find the area of the rectangle if $x=24$ and $\frac{y}{x}=\frac{3}{2}$ $A=864u^2$

② Find the equations for the tangent and normal lines to the curve $6x^2 + 3xy + 2y^2 + 17y - 6 = 0$ at $(-1, 0)$.

$$12x \frac{dx}{dx} + 3(x \frac{dy}{dx} + y \frac{dx}{dx}) + 4y \frac{dy}{dx} + 17 \frac{dy}{dx} - 0 = 0$$

$$\underline{\underline{12x}} + 3x \frac{dy}{dx} + \underline{\underline{3y}} + 4y \frac{dy}{dx} + 17 \frac{dy}{dx} = 0$$

$$3x \frac{dy}{dx} + 4y \frac{dy}{dx} + 17 \frac{dy}{dx} = -12x - 3y$$

$$\frac{dy}{dx} (3x + 4y + 17) = -12x - 3y$$

$$\boxed{\frac{dy}{dx} = \frac{-12x - 3y}{3x + 4y + 17}}$$

$$\left. \frac{dy}{dx} \right|_{(-1, 0)} = \frac{-12(-1) - 3(0)}{3(-1) + 4(0) + 17}$$

$$= \frac{12}{14} = \boxed{\frac{6}{7}}$$

$$\text{tan} \Rightarrow y = \frac{6}{7}(x+1)$$

$$\text{Normal} \Rightarrow y = -\frac{7}{6}(x+1)$$

Sect. 3.7

#18, 19, 22, 23, 25, 29, 30

$$\textcircled{\#25} \quad y = 2 \sin(\pi x - y)$$

$$\frac{dy}{dx} = 2 \cos(\pi x - y) \cdot \left(\pi - \frac{dy}{dx} \right)$$

$$\frac{dy}{dx} = 2\pi \cos(\pi x - y) - 2 \cos(\pi x - y) \frac{dy}{dx}$$

$$\underline{\underline{\frac{dy}{dx}}} + 2 \cos(\pi x - y) \underline{\underline{\frac{dy}{dx}}} = 2\pi \cos(\pi x - y)$$

$$\frac{dy}{dx} \left(1 + 2 \cos(\pi x - y) \right) = 2\pi \cos(\pi x - y)$$

$$\frac{dy}{dx} = \frac{2\pi \cos(\pi x - y)}{1 + 2 \cos(\pi x - y)}$$

$$(29) \quad y^2 = x^2 + 2x$$

$$2y \frac{dy}{dx} = 2x + 2$$

$$\frac{dy}{dx} = \frac{2x+2}{2y}$$

$$\underline{\underline{\frac{dy}{dx} = \frac{x+1}{y}}}$$

$$\frac{d^2y}{dx^2} = \frac{y(1) - (x+1)\frac{dy}{dx}}{y^2}$$

$$\frac{d^2y}{dx^2} = \frac{y - x+1\left(\frac{x+1}{y}\right)}{y^2}$$

$$= \frac{y - \frac{(x+1)^2}{y}}{y^2}$$

$$\frac{\frac{y^2}{y} - \frac{(x+1)^2}{y}}{y^2}$$

$$\frac{y^2 - (x+1)^2}{y} \cdot \frac{1}{y^2}$$

$$\boxed{\frac{d^2y}{dx^2} = \frac{y^2 - (x+1)^2}{y^3}}$$

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(HW) { #29, 30, 34-42 (even), 43, 49, 51-53, 57
Weekly Review 4

Answers

(34) $\frac{1}{4}(x)^{-3/4}$

(36) $-4(1-6x)^{-\frac{1}{3}}$

(38) $(x^2+1)^{-3/2}$

(40) $x^{-3/2}(2x^{-1/2}+1)^{-4/3}$

(42) $\frac{5}{4} \sin^{\frac{1}{4}}(x+5) \cdot \cos(x+5)$